NOISE AND VIBRATION STUDY

Quarry Creek Master Plan
Carlsbad, CA

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GLOSSARY OF TERMS

Sound Pressure Level (SPL): a ratio of one sound pressure to a reference pressure (L_{ref}) of 20 μPa. Because of the dynamic range of the human ear, the ratio is calculated logarithmically by 20 log (L/L_{ref}).

A-weighted Sound Pressure Level (dBA): Some frequencies of noise are more noticeable than others. To compensate for this fact, different sound frequencies are weighted more.

Minimum Sound Level (L_{min}): Minimum SPL or the lowest SPL measured over the time interval using the A-weighted network and slow time weighting.

Maximum Sound Level (L_{max}): Maximum SPL or the highest SPL measured over the time interval the A-weighted network and slow time weighting.

Equivalent sound level (L_{eq}): the true equivalent sound level measured over the run time. Leq is the A-weighted steady sound level that contains the same total acoustical energy as the actual fluctuating sound level.

Day Night Sound Level (LDN): Representing the Day/Night sound level, this measurement is a 24 –hour average sound level where 10 dB is added to all the readings that occur between 10 pm and 7 am. This is primarily used in community noise regulations where there is a 10 dB "Penalty" for night time noise. Typically LDN's are measured using A weighting.

Community Noise Exposure Level (CNEL): The accumulated exposure to sound measured in a 24-hour sampling interval and artificially boosted during certain hours. For CNEL, samples taken between 7 pm and 10 pm are boosted by 5 dB; samples taken between 10 pm and 7 am are boosted by 10 dB.

Octave Band: An octave band is defined as a frequency band whose upper band-edge frequency is twice the lower band frequency.

Third-Octave Band: A third-octave band is defined as a frequency band whose upper band-edge frequency is 1.26 times the lower band frequency.

Response Time (F,S,I): The response time is a standardized exponential time weighting of the input signal according to fast (F), slow (S) or impulse (I) time response relationships. Time response can be described with a time constant. The time constants for fast, slow and impulse responses are 1.0 seconds, 0.125 seconds and 0.35 milliseconds, respectively.

EXECUTIVE SUMMARY

This noise study has been completed to determine the noise and vibration impacts to and from the proposed residential project. The proposed Quarry Creek Master Plan is located on 155-acre project site in northern Carlsbad, CA. The site is situated south of State Route 78 and will have access from Marron Road in the City of Carlsbad.

The Quarry Creek Master Plan project proposes 656 dwelling units, 1.5 net acres of community facilities, and a 0.9 acre park and ride lot. The findings of the noise analysis for the proposed Quarry Creek Master Plan are provided below:

Construction Noise Levels

Due to physical constraints and normal site preparation operations, most of the equipment will be spread out over the site. For example: the rock drills may be working in the eastern portion of the site while the dozers, tractors and scrapers are operating in the western or southern portions of the site. Some of the equipment will then move to bring the blasted material to areas where fill is needed. Due to the size of the site some equipment could be operating near the property line while the rest of the equipment may be located over 1,000 feet from the same property line. This would result in an acoustical center for the grading operation at approximately 500 feet from the nearest property line. .

If all the equipment was operating in the same location, which is not physically possible, at a distance as close as 310-feet from the nearest property line the point source noise attenuation from construction activities is -15.8 dBA. This would result in an anticipated worst-case combined noise level of 75 dBA at the property line. Given this and the spatial separation of the equipment, the noise levels will comply with the 75 dBA standard at all Project property lines. As a result, no impacts will occur and no mitigation measures are required.

Construction Vibration

The nearest vibration-sensitive uses are commercial uses located to the east, 100 feet or more from the proposed construction. The average vibration levels that would be experienced at the nearest vibration sensitive land uses to the east from temporary construction activities. Loaded trucks will be traveling along the western portion of the site and were assessed at a minimum distance of 100 feet to be conservative.

The FTA has determined vibration levels that would cause annoyance to a substantial number of people and potential damage to building structures. The FTA criterion for vibration induced structural damage is 0.30 in/sec for the peak particle velocity (PPV) for "Engineered concrete and masonry buildings". Project construction activities would result in PPV levels below the

FTA’s criteria for vibration induced structural damage. Therefore, project construction activities would not result in vibration induced structural damage to buildings near the demolition and construction areas. The FTA criterion for infrequent vibration induced annoyance is 83 Vibration Velocity (VdB) for commercial uses. Construction activities would generate levels of vibration that would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

The nearest residential uses are located more than 1,000 feet from the potential blasting locations and vibration sources. Based on this distance separation no vibration impacts are anticipated from the Project’s construction operations.

Blasting Vibration

Blasting for construction projects typically results in an RMS vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This is equivalent to a peak particle velocity of about 0.4 inch per second. Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing commercial use would be about 88 VdB and 0.15 inch per second, respectively. Based on the construction vibration damage criteria published by the FTA, the threshold for vibration levels to damage “Engineered concrete and masonry buildings" are 98 VdB and 0.30 inch per second. Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 83 VdB would be slightly exceeded when blasting occurred within about 100 feet of existing commercial uses. If blasting is required within 100 feet of existing residences, the potential annoyance may not be completely avoided it can be minimized by following proper blasting procedures and with proper notice annoyances can be avoided.

The nearest residential uses are located more than 1,000 feet from the potential blasting locations and vibration sources. Based on this distance separation no vibration impacts are anticipated from the Project’s blasting operations.

Transportation Noise Levels – Onsite

Based upon these findings and the current site layout, the future noise levels were found to be at or below 60 dBA CNEL and no noise mitigation is required to comply with the City of Carlsbad Noise standards. The Project will require a site specific noise study be prepared for each residential Lot based upon the final site design, building orientation and pad elevations to ensure compliance with the City’s exterior noise thresholds.

In addition, second floor receptors were also modeled at 15 feet above the pad elevations to determine noise levels at the building facades. Based on these findings, the second level building facades are anticipated to be above 60 dBA CNEL at Lots 1-4 and based on the site specific study findings a final interior noise assessment will presumably be required prior to the issuance of the first building permit. This final report would identify the interior noise requirements based upon architectural and building plans. It should be noted; interior noise levels of 45 dBA CNEL can easily be obtained with conventional building construction methods and providing a closed window condition requiring a means of mechanical ventilation (e.g. air conditioning) for each building and upgraded windows for all sensitive rooms (e.g. bedrooms and living areas).

Offsite Project Related Transportation Noise Levels

The overall roadway segment noise levels will increase from 0.0 dBA CNEL to 4.2 dBA CNEL with the development of the Project. The Project does create a direct noise increase of more than 3 dBA CNEL on Haymar Drive/Plaza Drive between the Project driveways to College Boulevard. This segment of road is comprised of commercial uses and no noise sensitive receptors are present. Additionally, the projected noise level is below 60 dBA CNEL. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

1.0 PROJECT INTRODUCTION

1.1 Purpose of this Study

The purpose of this Noise study is to determine noise impacts, if any, to the Project from off-site sources (i.e. traffic along State Route 78 and Marron Road) and impacts from the Project construction and operations (i.e. traffic generated). Should impacts be determined, the intent of this study would be to recommend suitable mitigation measures to reduce impacts to below a level of significance.

1.2 Project Location

The Project site is located south of and adjacent to State Route 78 just west of College Boulevard, within the northern portion of the City of Carlsbad CA. Access to the Project site is provided by Marron Road and Haymar Drive from College Blvd to the east of the Project site. State Route 78 to College Blvd south provides regional access to the Project site. A general Project vicinity map is shown in Figure 1–1 on the following page.

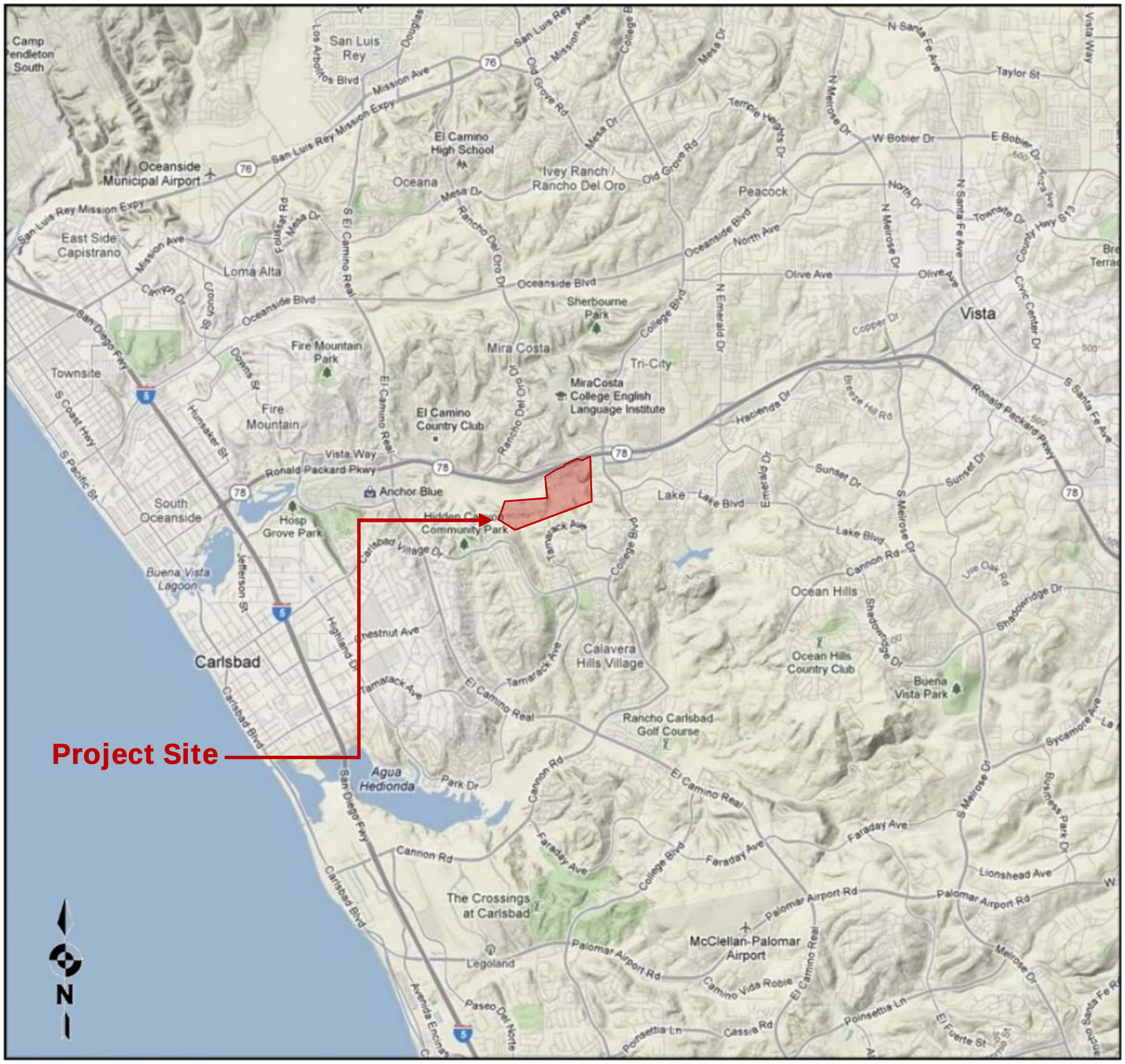
1.3 Project Description

The Project consists of a 656 unit residential development, a 2.5 acre nature/education center, a 1.5 acre community facilities site (daycare), a 1.3 acre park and ride site, and 72 acres of open space. High density residential (20 units per acre minimum) is proposed on the northerly side of the creek and residential medium high density (12 units per acre minimum) is proposed on the southerly side of the creek. The proposed Project site layout, which is 155.38 acres, is shown in Figure 1–2 on the following Page.

Grading of the proposed Project will disturb roughly 74 acres of the 155.38 acre project site and would consist of clearing/grubbing, mass and finish grading and would be expected to last approximately five (5) months long. As part of that work, the Project engineer also expects that blasting operations will be necessary. The blasting operations would occur over a 10-day period with seven days of rock drilling and three days of blasting. During this operation, grading operations will occur simultaneously. It’s expected that the balanced earthwork quantities will be 610,000 CY with 27,000 CY developed from blasting.

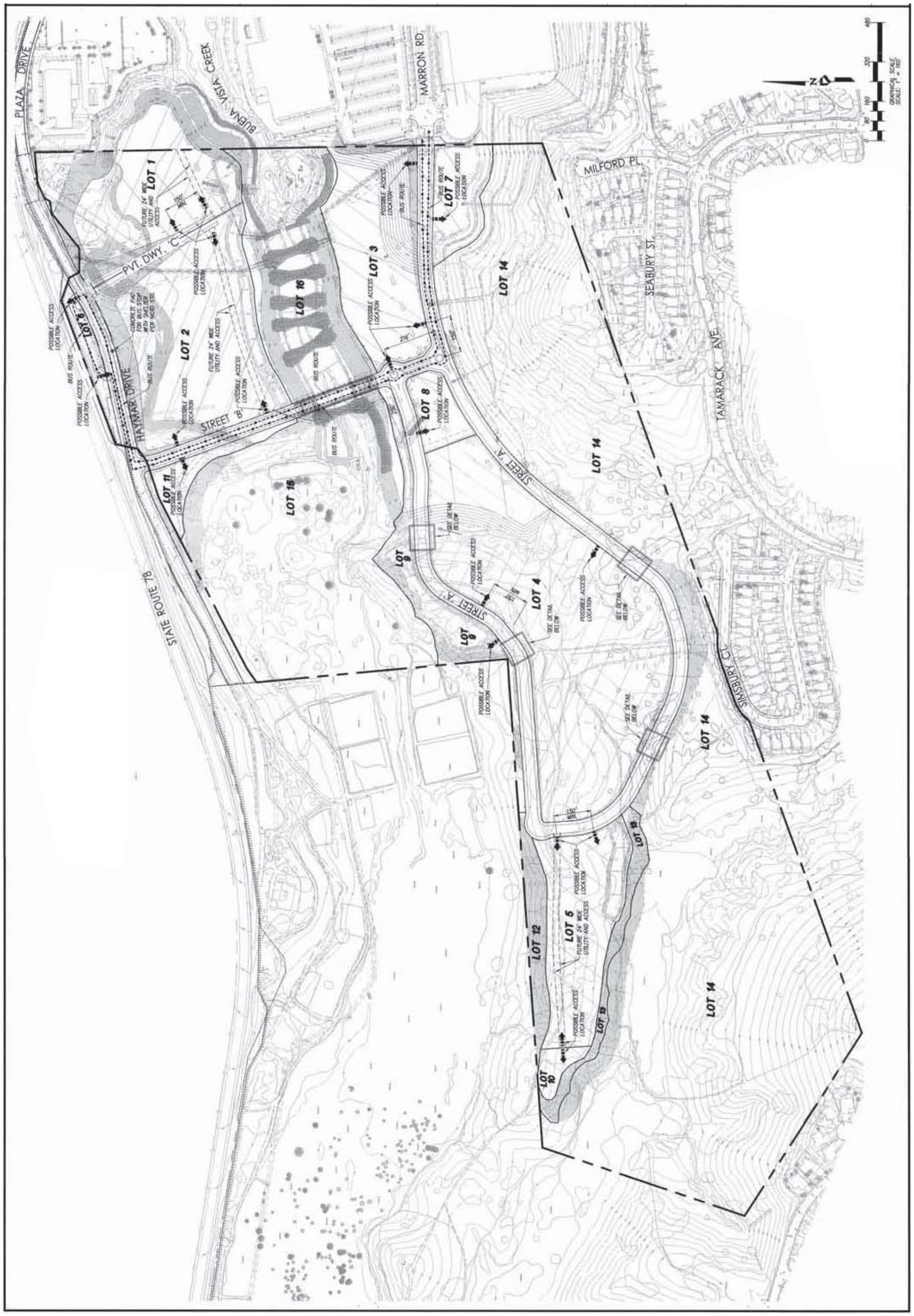
After grading is complete, the Project would start the trenching operations for wet and dry utilities and would last approximately 225 working days following with the commencement of building construction which would begin a three year process of building out the remainder of the proposed development.

Figure 1-A: Project Vicinity Map



Source: Google Maps, 8/12

Figure 1-B: Proposed Project Site Layout



Project Design Consultants 2012

2.0 ACOUSTICAL FUNDAMENTALS

2.1 Acoustical Fundamentals

Noise is defined as unwanted or annoying sound which interferes with or disrupts normal activities. Exposure to high noise levels has been demonstrated to cause hearing loss. The individual human response to environmental noise is based on the sensitivity of that individual, the type of noise that occurs, and when the noise occurs.

Sound is measured on a logarithmic scale consisting of sound pressure levels known as a decibel (dB). The sounds heard by humans typically do not consist of a single frequency but of a broadband of frequencies having different sound pressure levels. The method for evaluating all the frequencies of the sound is to apply an A-weighting to reflect how the human ear responds to the different sound levels at different frequencies. The A-weighted sound level adequately describes the instantaneous noise whereas the equivalent sound level depicted as Leq represents a steady sound level containing the same total acoustical energy as the actual fluctuating sound level over a given time interval.

The Community Noise Equivalent Level (CNEL) is the 24-hour A-weighted average for sound, with corrections for evening and nighttime hours. The corrections require an addition of 5 decibels to sound levels in the evening hours between 7 p.m. and 10 p.m. and an addition of 10 decibels to sound levels at nighttime hours between 10 p.m. and 7 a.m. These additions are made to account for the increased sensitivity during the evening and nighttime hours when sound appears louder.

A vehicles noise level is a combination of the noise produced by a vehicle's engine, exhaust, and tires. The cumulative traffic noise levels along a roadway segment are based on three primary factors: the amount of traffic, the travel speed of the traffic, and the vehicle mix ratio or number of medium and heavy trucks. The intensity of traffic noise is increased by higher traffic volumes, greater speeds, and increased number of trucks.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiate in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt, and hard pack dirt while soft site conditions exist in areas having slight grade changes, landscaped areas, and vegetation. Alternately, fixed/point sources radiate outward uniformly as it travels away from the source. Their sound levels attenuate or drop off at a rate of 6 dBA for each doubling of distance.

The most effective noise reduction methods consist of controlling the noise at the source and blocking the noise transmission with barriers. Any or all of these methods may be required to reduce noise levels to an acceptable level. To be effective, a noise barrier must have enough mass to prevent significant noise transmission through it and high enough and long enough to shield the receiver from the noise source. A safe minimum surface weight for a noise barrier is 3.5 pounds/square foot (equivalent to 3/4-inch plywood), and the barrier must be carefully constructed so that there are no cracks or openings.

Barriers constructed of wood or as a wooden fence must have minimum design considerations as follows: the boards must be ¾ inch thick and free of any gaps or knot holes. The design must also incorporate either overlapping the boards at least 1 inch or utilizing a tongue-and-grove design for this to be achieved.

2.2 Vibration Fundamentals

Vibration is a trembling or oscillating motion of the ground. Like noise, vibration is transmitted in waves, but in this case through the ground or solid objects. Unlike noise, vibration is typically felt rather than heard. Vibration can be either natural as in the form of earthquakes, volcanic eruptions; or manmade as from explosions, heavy machinery, or trains. Both natural and manmade vibration may be continuous, such as from operating machinery; or infrequent, as from an explosion.

As with noise, vibration can be described by both its amplitude and frequency. Amplitude may be characterized in three ways: displacement, velocity, and acceleration. Particle displacement is a measure of the distance that a vibrated particle travels from its original position and for the purposes of soil displacement is typically measured in inches or millimeters. Particle velocity is the rate of speed at which soil particles move in inches per second or millimeters per second. Particle acceleration is the rate of change in velocity with respect to time and is measured in inches per second or millimeters per second. Typically, particle velocity (measured in inches or millimeters per second) and/or acceleration (measured in gravities) are used to describe vibration. Table 2-1 shows the human reaction to various levels of peak particle velocity.

Vibrations also vary in frequency and this affects perception. Typical construction vibrations fall in the 10 to 30 Hz range and usually occurring around 15 Hz. Traffic vibrations exhibit a similar range of frequencies; however, due to their suspension systems, it is less common, to measure traffic frequencies above 30 Hz.

Propagation of ground-borne vibrations is complicated and difficult to predict because of the endless variations in the soil through which the waves travel. There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by dropping an object into water. P-waves, or compression waves, are waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced with distance as a result of material damping in the form of internal friction, soil layering, and special voids. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

Table 2-1: Human Reaction to Typical Vibration Levels

Vibration Level Peak Particle Velocity (in/sec)	Human Reaction	Effect on Buildings
0.006–0.019	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage
Source: Caltrans, Division of Environmental Analysis, *Transportation Related Earthborne Vibration, Caltrans Experiences*, Technical Advisory, Vibration, TAV-02-01-R9601, 2002.		

3.0 SIGNIFICANCE THRESHOLDS AND STANDARDS

3.1 Transportation Related Noise

The City of Carlsbad's Noise Guidelines Manual (1995) requires that all exterior sensitive areas shall limit noise exposure. For noise sensitive residential land uses, the City has adopted a policy which has established a "normally acceptable" exterior noise level goal of 60 dBA CNEL for the outdoor areas and an interior noise level of less than 45 dBA CNEL. For residential properties identified as requiring a noise study, a study shall be prepared by an acoustical professional. This study shall document the projected maximum exterior noise level and mitigate the projected exterior noise level to a maximum allowable noise level as identified in Noise Guideline Manual.

Interior noise levels should be mitigated to a maximum of 45 dBA CNEL in all habitual rooms when the exterior of the residence are exposed to levels of 60 dBA CNEL or more. If windows and doors are required to be closed to meet the interior noise standard, then mechanical ventilation shall be provided per City requirements.

3.2 Construction Noise

Chapter 8.48 of the City of Carlsbad Municipal Code addresses Noise. Section 8.48.010 limits disturbing or offensive construction noise to the hours between 7:00 a.m. and sunset on weekdays and between 8:00 a.m. and sunset on Saturdays, and prohibits such noise on Sundays and on 7 major holidays. Section 8.48.020 allows the city manager to permit exceptions to these limits in nonresidential zones where there are no inhabited dwellings within 1,000 feet of the source of noise.

The Project site is bordered by the City of Oceanside on the north and east. The City of Oceanside Noise Element controls noise levels due to construction operations. It shall be unlawful for any person to operate construction equipment at any construction site, except as outlined in subsections (a) and (b) below:

(a) It shall be unlawful for any person to operate any construction equipment at a level in excess of 85 dBA at 100 feet from the source.

(b) It should be unlawful for any person to engage in construction activities between 6 PM and 7 AM when such activities exceed the ambient noise level 5 dBA. A special permit may be granted by the Director of Public Works if extenuating circumstances exist.

Because the Cities of Oceanside and Carlsbad do not have property line standards for construction, the County of San Diego's 75 dBA Leq standard is utilized in the analysis.

3.3 Blasting and Vibration Standards

The City of Carlsbad and Oceanside have not yet adopted vibration criteria. The United States Department of Transportation Federal Transit Administration (FTA) provides criteria for acceptable levels of groundborne vibration for various types of special buildings that are sensitive to vibration. For purposes of identifying potential project-related vibration impacts, the FTA criteria will be used. The human reaction to various levels of vibration is highly subjective. The upper end of the range shown for the threshold of perception, or roughly 65 VdB, may be considered annoying by some people. Vibration below 65 VdB may also cause secondary audible effects, such as a slight rattling of doors, suspended ceilings/fixtures, windows, and dishes, any of which may result in additional annoyance. Table 3-1 below, shows the FTA groundborne vibration and noise impact criteria for human annoyance.

Table 3-1: Groundborne Vibration and Noise Impact Criteria (Human Annoyance)

	Groundborne Vibration Impact Levels (VdB re 1 microinch/second)			Groundborne Noise Impact Levels (dB re 20 micropascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* June 2006.

1 "Frequent Events" are defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

2 "Occasional Events" are defined as between 30 and 70 vibration events of the same source per day. Most commuter truck lines have this many operations.

3 "Infrequent Events" are defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines

4 This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

5 Vibration-sensitive equipment is not sensitive to groundborne noise.

In addition to the vibration annoyance standards presented above, the FTA also applies the following standards for construction vibration damage. As shown in Table 3-2 on the following page, structural damage is possible for typical commercial construction when the peak particle velocity (PPV) exceeds 0.3 inch per second (in/sec). This criterion is the threshold at which there is a risk of damage to normal dwellings.

Table 3-2: Groundborne Vibration Impact Criteria (Structural Damage)

Building Category	PPV (in/sec)	VdB
I. Reinforced-concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* June 2006.
Notes: RMS velocity calculated from vibration level (VdB) using the reference of one microinch/second.

In the context of this analysis, the noise and vibration impacts associated with the temporary blasting and construction operations will be conditioned to comply with the thresholds stated above. The potential noise and vibration impacts are analyzed separately below.

4.0 NOISE ENVIRONMENT

4.1 Existing Noise Environment Onsite

Noise measurements were taken Tuesday August 16, 2012, in the afternoon hours using a Larson-Davis Model LxT Type 1 precision sound level meter, programmed, in "slow" mode, to record noise levels in "A" weighted form. The sound level meter and microphone were mounted on a tripod, five feet above the ground and equipped with a windscreen during all measurements. The sound level meter was calibrated before and after the monitoring using a Larson-Davis calibrator, Model CAL 200.

Monitoring location 1 (ML1) was located in the future location of Lot 2; monitoring location 2 (ML2) was located in the future location of Lot 3. Monitoring location 3 (ML3) was located in the future location of Lot 4; monitoring location 4 (ML4) was located in the future location of Lot 15. The results of the noise level measurements are presented in Table 4-1.

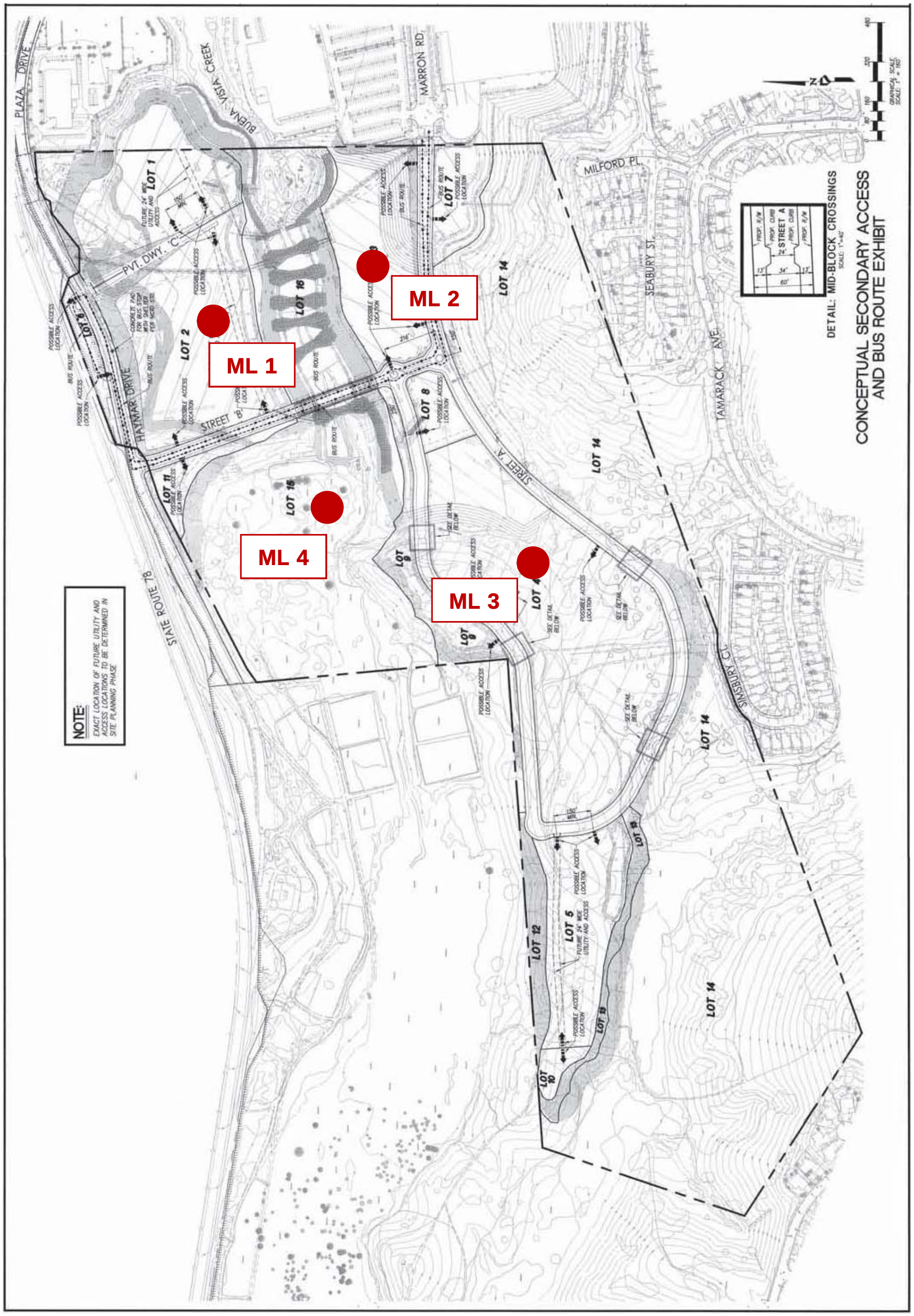
The noise measurements were monitored for a time period of 30 minutes during heavy traffic conditions. The existing noise levels in the Project area consisted primarily of traffic from State Route 78. The ambient Leq noise levels measured in the area of the Project during the afternoon hours were found to be 48-50.8 dBA. The statistical indicators Lmax, Lmin, L10, L50 and L90, are given for the monitoring location. As can be seen from the L90 data, 90% of the time the noise level is approximately 45.7-48.6 dBA from State Route 78. The lower noise levels are due to the vertical off set between State Route 78 and the Project site (the roadway is located 50 feet or more above the site). The noise monitoring locations are provided graphically in Figure 4-1 on the following page.

Table 4-1: Measured Ambient Noise Levels

Measurement Identification	Description	Time	Noise Levels (dBA)					
			Leq	Lmax	Lmin	L10	L50	L90
M1	Lot 2	7:05-7:35 p.m.	50.8	65.4	47.4	52.4	50.1	48.6
M2	Lot 3	5:08-5:43 p.m.	49.4	58	46.1	50.8	48.9	47.5
M3	Lot 4	5:48-6:18 p.m.	48.0	61.4	44.3	50.0	47.1	45.7
M4	Lot 15	6:22-7:03 p.m.	50.6	63.6	45.9	52.6	49.5	47.7

Source: Ldn Consulting, Inc. August 16, 2012

Figure 4-1: Ambient Noise Monitoring Locations



4.2 Future Onsite Noise Prediction

The critical model input parameters, which determine the projected vehicular traffic noise levels, include vehicle travel speeds, the percentages of automobiles, medium trucks and heavy trucks in the roadway volume, the site conditions (hard or soft) and the peak hour traffic volume. The peak hour traffic volumes along most roadways range between 6-10% of the average daily traffic (ADT). The capacity in a single freeway lane is 1,800 vehicles per hour due to shortened headways between vehicles *(Source: Caltrans).* Thus, peak hour traffic values along State Route 78 were calculated using a worst-case scenario capacity of 1,800 vehicles per hour per lane operating at a Level of Service C.

Table 4-2 presents the roadway parameters used in the analysis including the average daily traffic volumes, speeds and the hourly traffic flow distribution (vehicle mix) for both the existing and future conditions. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the Sound32 Model. A standard City traffic mix of 97.89/1.83/0.28 was utilized on Marron Road and a mix of 95.1/2.3/2.6 was utilized for State Route 78 based on Caltrans Annual Average Truck Trip volumes for State Route 78.

Table 4-2: Traffic Parameters

Roadway	Year	Average Daily Traffic (ADT)	Peak Hour Volume	Modeled Speeds (MPH)	Vehicle Mix %		
					Auto	Medium Trucks	Heavy Trucks
Marron Road	2030	20,200[1]	2,020	30	97.89[3]	1.83[3]	0.28[3]
State Route 78	2030	144,000	14,400[2]	65	95.1	2.3	2.6

[1] Source: Urban Systems Associates Traffic Impact Analysis
[2] Source: Peak vehicles per lane per hour (Caltrans)
[3] Vehicle Mixed defined in City of Carlsbad Noise Guideline Manual

The required coordinate information necessary for the Sound32 traffic noise prediction model input was taken from the preliminary site plans provided by Project Design Consultants, 2012. To predict the future noise levels the preliminary site plans were used to identify the pad elevations, the roadway elevations, and the relationship between the noise source(s) and the receptor areas. Traffic was consolidated into a single lane for each directional flow of State Route 78 and into a single lane for both directional flows of traffic on Marron Road. The roadway segments were extended a minimum of 500 feet beyond the observer locations. To evaluate the potential noise impacts on the proposed development, outdoor observers were placed five feet above the pad elevation and located within each use area or Lot. The Buildout conditions includes the future year 2030 traffic volume forecasts provided in the traffic impact analysis performed by Urban

Systems Associates and the peak hour traffic volumes from Caltrans as shown in Table 4-2.

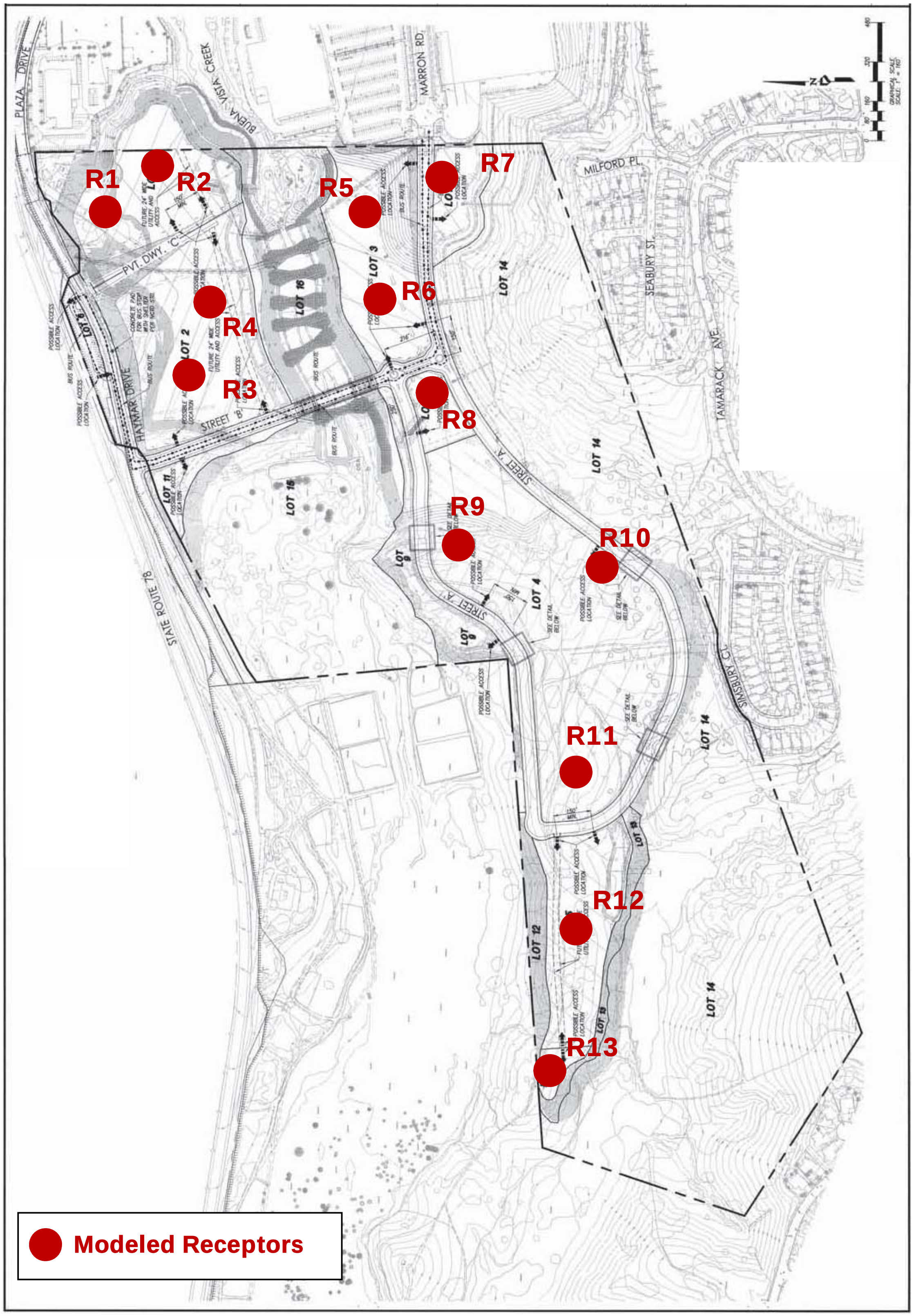
Based upon these findings and the current site layout, the future noise levels were found to be at or below 60 dBA CNEL and no noise mitigation is required to comply with the City of Carlsbad Noise standards. The Project will require a site specific noise study be prepared for each residential Lot based upon the final site design, building orientation and pad elevations to ensure compliance with the City's exterior noise thresholds.

In addition, second floor receptors were also modeled at 15 feet above the pad elevations to determine noise levels at the building facades. Based on these findings, the second level building facades are anticipated to be above 60 dBA CNEL at Lots 1-4 and based on the site specific study findings a final interior noise assessment will presumably be required prior to the issuance of the first building permit. This final report would identify the interior noise requirements based upon architectural and building plans. It should be noted; interior noise levels of 45 dBA CNEL can easily be obtained with conventional building construction methods and providing a closed window condition requiring a means of mechanical ventilation (e.g. air conditioning) for each building and upgraded windows for all sensitive rooms (e.g. bedrooms and living areas). The modeling results are quantitatively shown in Table 4-3 below for both the ground level receptors and the second level building facades. The modeled observer locations for each Lot are presented in Figure 4-2 on the following page. The S32 models input parameters and output files for the future conditions are provided in ***Attachment A***.

Table 4-3: Traffic Related Exterior Noise Levels

Receptor Number	Location	Proposed Use	Unmitigated Ground Floor Noise Levels (dBA CNEL)	Second Floor Building Façade Noise Levels (dBA CNEL)
1	Lot 1	Residential	56	61
2	Lot 1	Residential	57	62
3	Lot 2	Residential	60	63
4	Lot 2	Residential	60	65
5	Lot 3	Residential	55	61
6	Lot 3	Residential	57	62
7	Lot 7	Community Facility	55	60
8	Lot 4	Residential	59	63
9	Lot 4	Residential	59	64
10	Lot 4	Residential	59	62
11	Lot 5	Residential	57	60
12	Lot 10	Community Facility	56	59

Figure 4-2: Modeled Receptors Locations



4.3 Offsite Project Related Transportation Noise Levels

The offsite Project related roadway segment noise levels projected in this report were calculated using the methods in the Highway Noise Model published by the Federal Highway Administration (FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108, December, 1978). The FHWA Model uses the traffic volume, vehicle mix, speed, and roadway geometry to compute the equivalent noise level. A spreadsheet calculation was used which computes equivalent noise levels for each of the time periods used in the calculation of CNEL. Weighting these equivalent noise levels and summing them gives the CNEL for the traffic projections. The noise contours are then established by iterating the equivalent noise level over many distances until the distance to the desired noise contour(s) are found.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiate in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt, and hard pack dirt, while soft site conditions exist in areas having slight grade changes, landscaped areas, and vegetation. Hard site conditions, to be conservative, were used to develop the identified noise contours and analyze noise impacts along all roadway segments. The future traffic noise model utilizes a typical, city of Carlsbad vehicle mix 97.89% Autos, 1.83% Medium Trucks, and .28% Heavy Trucks for all analyzed roadway segments. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks, and heavy trucks for input into the FHWA Model.

Community noise level changes greater than 3 dBA are often identified as audible and considered potentially significant, while changes less than 1 dBA will not be discernible to local residents. In the range of 1 to 3 dBA, residents who are very sensitive to noise may perceive a slight change. There is no scientific evidence available to support the use of 3 dBA as the significance threshold; community noise exposures are typically over a long time period rather than the immediate comparison made in a laboratory situation. Therefore, the level at which changes in community noise levels become discernible is likely greater than 1 dBA and 3 dBA appears to be appropriate for most people.

For the purposes for this analysis, a direct or cumulative roadway noise impacts would be considered significant if the project increases noise levels for a noise sensitive land use by 3 dBA CNEL and if the project increases noise levels above an unacceptable noise level per the City's Guideline Manual in a sensitive use area adjacent to the roadway segment. Both the Project related direct and cumulative roadway noise level increases are analyzed below.

Direct Traffic Noise Levels

To determine if direct offsite noise level increases associated with the development of the Project will create noise impacts, the noise levels for the existing conditions were compared with the noise level increase from when the Project is built. Utilizing the Project's traffic assessment (Source: Urban Systems Associates, 2012), noise contours were developed for the following traffic scenarios:

Existing: Current day noise conditions without construction of the project.
Existing Plus Project: Current day noise conditions plus the completion of the project.
Existing vs. Existing Plus Project: Comparison of the project related noise level increases.

The noise levels and reference distances to the 60 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 4-4 for the Existing Scenario and in Table 4-5 for the Existing Plus Project Scenario. Table 4-6 presents the comparison of the Existing Year with and without Project related noise levels.

Table 4-4: Existing Noise Levels without Project

Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
El Camino Real - Via Las Rosas to Vista Way	36,675	45	73.8	417
El Camino Real - Vista Way to SR-78 WB Ramps	53,859	45	75.5	539
College Blvd - Barnard Dr. to Vista Way	37,572	45	73.9	424
College Blvd - Vista Way to Plaza Dr.	44,884	45	74.7	477
College Blvd - Plaza Dr. to Marron Rd.	36,219	45	73.8	414
College Blvd - Marron Rd. to South City Limit	24,475	35	69.2	206
Vista Way - Jefferson St. to El Camino Real	15,579	35	67.3	152
Vista Way - El Camino Real to Rancho Del Oro Rd.	15,330	35	67.2	151
Vista Way - Rancho Del Oro Rd. to College Blvd.	20,300	35	68.4	182
Vista Way - College Blvd. to SR-78 WB Ramps	28,000	35	69.8	225
Vista Way - SR-78 WB Ramps to Thunder Dr.	16,097	35	67.4	156
Marron Rd./Lake Blvd - Driveway to College Blvd.	16,907	30	66.1	127
Marron Rd./Lake Blvd - College Blvd. to Thunder Dr.	13,813	30	65.2	111
Marron Rd./Lake Blvd - Thunder Dr. to Sundown Lane	14,800	30	65.5	116
Haymar Dr./Plaza Dr. - Driveway to College Blvd	1,510	30	55.6	25
Haymar Dr./Plaza Dr. - College Blvd to SR-78 WB Ramps	22,063	30	67.2	152
Haymar Dr./Plaza Dr. - SR-78 WB Ramps to Thunder Dr.	11,965	30	64.6	101
Rancho Del Oro Rd. - Vista Way to Tournament Dr.	13,900	30	65.2	112

[1] Source: Project Traffic study prepared by Urban Systems Associates, 2012

Table 4-5: Existing + Project Noise Levels

Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	65 dBA CNEL Contour Distance (Feet)
El Camino Real - Via Las Rosas to Vista Way	36,783	45	73.8	418
El Camino Real - Vista Way to SR-78 WB Ramps	53,967	45	75.5	540
College Blvd - Barnard Dr. to Vista Way	33,331	45	73.4	391
College Blvd - Vista Way to Plaza Dr.	47,662	45	75.0	497
College Blvd - Plaza Dr. to Marron Rd.	38,842	45	74.1	433
College Blvd - Marron Rd. to South City Limit	25,885	35	69.5	214
Vista Way - Jefferson St. to El Camino Real	15,633	35	67.3	153
Vista Way - El Camino Real to Rancho Del Oro Rd.	15,446	35	67.2	151
Vista Way - Rancho Del Oro Rd. to College Blvd.	20,544	35	68.5	183
Vista Way - College Blvd. to SR-78 WB Ramps	29,206	35	70.0	232
Vista Way - SR-78 WB Ramps to Thunder Dr.	16,260	35	67.4	157
Marron Rd./Lake Blvd - Driveway to College Blvd.	19,619	30	66.7	140
Marron Rd./Lake Blvd - College Blvd. to Thunder Dr.	14,084	30	65.3	113
Marron Rd./Lake Blvd - Thunder Dr. to Sundown Lane	15,017	30	65.6	117
Haymar Dr./Plaza Dr. - Driveway to College Blvd	3,950	30	59.8	48
Haymar Dr./Plaza Dr. - College Blvd to SR-78 WB Ramps	22,754	30	67.4	155
Haymar Dr./Plaza Dr. - SR-78 WB Ramps to Thunder Dr.	12,128	30	64.6	102
Rancho Del Oro Rd. - Vista Way to Tournament Dr.	13,954	30	65.2	112
[1] Source: Project Traffic study prepared by Urban Systems Associates, 2012				

The overall roadway segment noise levels will increase from -0.5 dBA CNEL to 4.2 dBA CNEL with the development of the Project as shown in Table 4-6 below. The Project does create a direct noise increase of more than 3 dBA CNEL on Haymar Drive/Plaza Drive between the Project driveways to College Boulevard. This segment of road is comprised of commercial uses and no noise sensitive receptors are present. Additionally, the existing plus Project noise level is below 60 dBA CNEL. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses. Note that the values given do not take into account the effect of any noise barriers, structures, or topography that may affect roadway noise levels.

Table 4-6: Existing vs. Existing + Project Noise Levels

Roadway Segment	Existing Noise Level @ 50-feet (dBA CNEL)	Existing + Project Noise Level @ 50-feet (dBA CNEL)	Difference (dBA CNEL)
El Camino Real - Via Las Rosas to Vista Way	73.8	73.8	0.0
El Camino Real - Vista Way to SR-78 WB Ramps	75.5	75.5	0.0
College Blvd - Barnard Dr. to Vista Way	73.9	73.4	-0.5
College Blvd - Vista Way to Plaza Dr.	74.7	75.0	0.3
College Blvd - Plaza Dr. to Marron Rd.	73.8	74.1	0.3
College Blvd - Marron Rd. to South City Limit	69.2	69.5	0.3
Vista Way - Jefferson St. to El Camino Real	67.3	67.3	0.0
Vista Way - El Camino Real to Rancho Del Oro Rd.	67.2	67.2	0.0
Vista Way - Rancho Del Oro Rd. to College Blvd.	68.4	68.5	0.1
Vista Way - College Blvd. to SR-78 WB Ramps	69.8	70.0	0.2
Vista Way - SR-78 WB Ramps to Thunder Dr.	67.4	67.4	0.0
Marron Rd./Lake Blvd - Driveway to College Blvd.	66.1	66.7	0.6
Marron Rd./Lake Blvd - College Blvd. to Thunder Dr.	65.2	65.3	0.1
Marron Rd./Lake Blvd - Thunder Dr. to Sundown Lane	65.5	65.6	0.1
Haymar Dr./Plaza Dr. - Driveway to College Blvd	55.6	59.8	**4.2**
Haymar Dr./Plaza Dr. - College Blvd to SR-78 WB Ramps	67.2	67.4	0.2
Haymar Dr./Plaza Dr. - SR-78 WB Ramps to Thunder Dr.	64.6	64.6	0.0
Rancho Del Oro Rd. - Vista Way to Tournament Dr.	65.2	65.2	0.0

Cumulative Traffic Noise Levels

To determine if cumulative off-site noise level increases associated with the development of the Project and other planned or permitted projects in the vicinity will create noise impacts. The noise levels for the near-term Project Buildout and other planned and permitted projects were compared with the existing conditions. Utilizing the Project's traffic assessment (Source: Urban Systems Associates, 2012) noise contours were developed for the following traffic scenarios:

Existing: Current day noise conditions without construction of the project.
Existing Plus Cumulative Projects Plus Project: Current day noise conditions plus the completion of the project and the completion of other permitted, planned projects or approved ambient growth factors.
Existing vs. Existing Plus Cumulative Plus Project: Comparison of the existing noise levels and the related noise level increases from the combination of the project and all other planned or permitted projects in the vicinity of the site.

The existing noise levels and reference distances to the 60 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 4-4 above for the Existing Scenario. The near-term cumulative noise conditions are provided in Table 4-7. No noise barriers or topography that may affect noise levels were incorporated in the calculations.

Table 4-7: Existing + Near Term + Project Noise Levels

Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
El Camino Real - Via Las Rosas to Vista Way	39,900	45	74.2	441
El Camino Real - Vista Way to SR-78 WB Ramps	57,400	45	75.8	562
College Blvd - Barnard Dr. to Vista Way	40,000	45	74.2	442
College Blvd - Vista Way to Plaza Dr.	51,000	45	75.3	520
College Blvd - Plaza Dr. to Marron Rd.	42,100	45	74.4	457
College Blvd - Marron Rd. to South City Limit	29,200	35	70.0	232
Vista Way - Jefferson St. to El Camino Real	15,800	35	67.3	154
Vista Way - El Camino Real to Rancho Del Oro Rd.	23,000	35	68.9	197
Vista Way - Rancho Del Oro Rd. to College Blvd.	22,100	35	68.8	192
Vista Way - College Blvd. to SR-78 WB Ramps	32,700	35	70.5	250
Vista Way - SR-78 WB Ramps to Thunder Dr.	19,200	35	68.2	175
Marron Rd./Lake Blvd - Driveway to College Blvd.	20,500	30	66.9	145
Marron Rd./Lake Blvd - College Blvd. to Thunder Dr.	14,600	30	65.4	115
Marron Rd./Lake Blvd - Thunder Dr. to Sundown Lane	15,500	30	65.7	120
Haymar Dr./Plaza Dr. - Driveway to College Blvd	4,000	30	59.8	49
Haymar Dr./Plaza Dr. - College Blvd to SR-78 WB Ramps	24,100	30	67.6	161
Haymar Dr./Plaza Dr. - SR-78 WB Ramps to Thunder Dr.	12,300	30	64.7	103
Rancho Del Oro Rd. - Vista Way to Tournament Dr.	15,700	30	65.8	121

[1] Source: Project Traffic study prepared by Urban Systems Associates, 2012

The overall roadway segment noise levels will increase from 0.0 dBA CNEL to 4.2 dBA CNEL with the development of the Project as shown in Table 4-8 below. The Project plus cumulative projects do create a noise increase of more than 3 dBA CNEL on Haymar Drive/Plaza Drive between the Project driveways to College Boulevard. This segment of road is comprised of commercial uses and no noise sensitive receptors are present. Additionally, the projected noise level is below 60 dBA CNEL. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses. Note that the values given do not take into account the effect of any noise barriers, structures, or topography that may affect roadway noise levels.

Table 4-8: Existing vs. Near Term + Project Noise Levels

Roadway Segment	Existing Noise Level @ 50-feet (dBA CNEL)	Existing + Project + Near Term Noise Level @ 50-feet (dBA CNEL)	Difference (dBA CNEL)
El Camino Real - Via Las Rosas to Vista Way	73.8	74.2	0.4
El Camino Real - Vista Way to SR-78 WB Ramps	75.5	75.8	0.3
College Blvd - Barnard Dr. to Vista Way	73.9	74.2	0.3
College Blvd - Vista Way to Plaza Dr.	74.7	75.3	0.6
College Blvd - Plaza Dr. to Marron Rd.	73.8	74.4	0.6
College Blvd - Marron Rd. to South City Limit	69.2	70.0	0.8
Vista Way - Jefferson St. to El Camino Real	67.3	67.3	0.0
Vista Way - El Camino Real to Rancho Del Oro Rd.	67.2	68.9	1.7
Vista Way - Rancho Del Oro Rd. to College Blvd.	68.4	68.8	0.4
Vista Way - College Blvd. to SR-78 WB Ramps	69.8	70.5	0.7
Vista Way - SR-78 WB Ramps to Thunder Dr.	67.4	68.2	0.8
Marron Rd./Lake Blvd - Driveway to College Blvd.	66.1	66.9	0.8
Marron Rd./Lake Blvd - College Blvd. to Thunder Dr.	65.2	65.4	0.2
Marron Rd./Lake Blvd - Thunder Dr. to Sundown Lane	65.5	65.7	0.2
Haymar Dr./Plaza Dr. - Driveway to College Blvd	55.6	59.8	**4.2**
Haymar Dr./Plaza Dr. - College Blvd to SR-78 WB Ramps	67.2	67.6	0.4
Haymar Dr./Plaza Dr. - SR-78 WB Ramps to Thunder Dr.	64.6	64.7	0.1
Rancho Del Oro Rd. - Vista Way to Tournament Dr.	65.2	65.8	0.6

5.0 CONSTRUCTION NOISE AND VIBRATION

5.1 Construction Noise Prediction Methodology

Construction noise represents a short-term impact on the ambient noise levels. Noise generated by construction equipment includes haul trucks, water trucks, graders, dozers, loaders, and scrapers and can reach relatively high levels. Grading activities typically represent one of the highest potential sources for noise impacts. The most effective method of controlling construction noise is through local control of construction hours and by limiting the hours of construction to normal weekday working hours.

Because the Cities of Oceanside and Carlsbad do not have property line standards for construction, the County of San Diego Noise Ordinance 36.409 standard is utilized in the analysis. The County Noise Ordinance states that with the exception of an emergency, it should be unlawful to conduct any construction activity so as to cause, at or beyond the property lines of any property zoned residential, an average sound level greater than 75 decibels from 7:00 a.m. to 7:00 p.m.

The U.S. Environmental Protection Agency (U.S. EPA) has compiled data regarding the noise generating characteristics of specific types of construction equipment. Noise levels generated by heavy construction equipment can range from 60 dBA to in excess of 100 dBA when measured at 50 feet. However, these noise levels diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 75 dBA measured at 50 feet from the noise source to the receptor would be reduced to 69 dBA at 100 feet from the source to the receptor, and reduced to 63 dBA at 200 feet from the source.

Using a point-source noise prediction model, calculations of the expected construction noise levels were completed. The essential model input data for these performance equations include the source levels of the equipment, source to receiver horizontal and vertical separations, the amount of time the equipment is operating in a given day (also referred to as the duty-cycle), and any transmission loss from topography or barriers.

5.2 Grading Activities Noise Findings and Mitigation

Based on the EPA noise emissions, empirical data and the amount of equipment needed, worst-case noise levels from the construction equipment operations would occur during the base operations (grading/site preparation). The construction schedule identifies that grading activities will occur in a single phase all at the same time, with anticipated equipment including 8 scrapers, 3 water trucks, 2 dozers, 1 grader, 6 highway trucks, 3 drill rigs, 1 excavator, and 1 loader. Due to physical constraints and normal site preparation operations, most of the equipment will be spread out over the site. For example: the rock drills may be working in the eastern portion of the site while the dozers, tractors and scrapers are operating in the western or southern portions of the site. Some of the equipment will then move to bring the blasted material to areas where fill is needed. Due to the size of the site some equipment could be operating near the property line while the rest of the equipment may be located over 1,000 feet from the same property line. This would result in an acoustical center for the grading operation at approximately 500 feet from the nearest property line.

As can be seen in Table 5-1 below, if all the equipment was operating in the same location, which is not physically possible, at a distance as close as 310-feet from the nearest property line the point source noise attenuation from construction activities is -15.8 dBA. This would result in an anticipated worst-case combined noise level of 75 dBA at the property line. Given this and the spatial separation of the equipment, the noise levels will comply with the 75 dBA standard at all Project property lines. As a result, no impacts will occur and no mitigation measures are required.

Table 5-1: Construction Noise Levels

Equipment Type	Quantity Used	Noise Level @ 50 Feet (dBA)	Cumulative Noise Level @ 50 Feet (dBA)
Tractor/Backhoe/Loader	1	72	72.0
Dozer D9 Cat	2	74	77.0
Grader	1	73	73.0
Water Trucks	3	70	74.8
Highway Trucks	6	75	82.8
Paver/Blade	1	75	75.0
Excavator	1	72	72.0
Scraper	8	75	84.0
Drill Rig	3	83	87.8
		Combined Cumulative Level	90.8
		Distance to Sensitive Use	310
		Noise Reduction due to Distance	-15.8
		Property Line Noise Level	75.0

5.3 Construction Vibration Findings and Mitigation

The nearest vibration-sensitive structures are located to the east, 100 feet or more from the proposed construction. Table 5-2 lists the average vibration levels that would be experienced at the nearest vibration sensitive land uses to the east from temporary construction activities.

Loaded trucks will be traveling along the western portion of the site and were assessed at a minimum distance of 100 feet to be conservative.

Table 5-2: Vibration Levels from Construction Activities

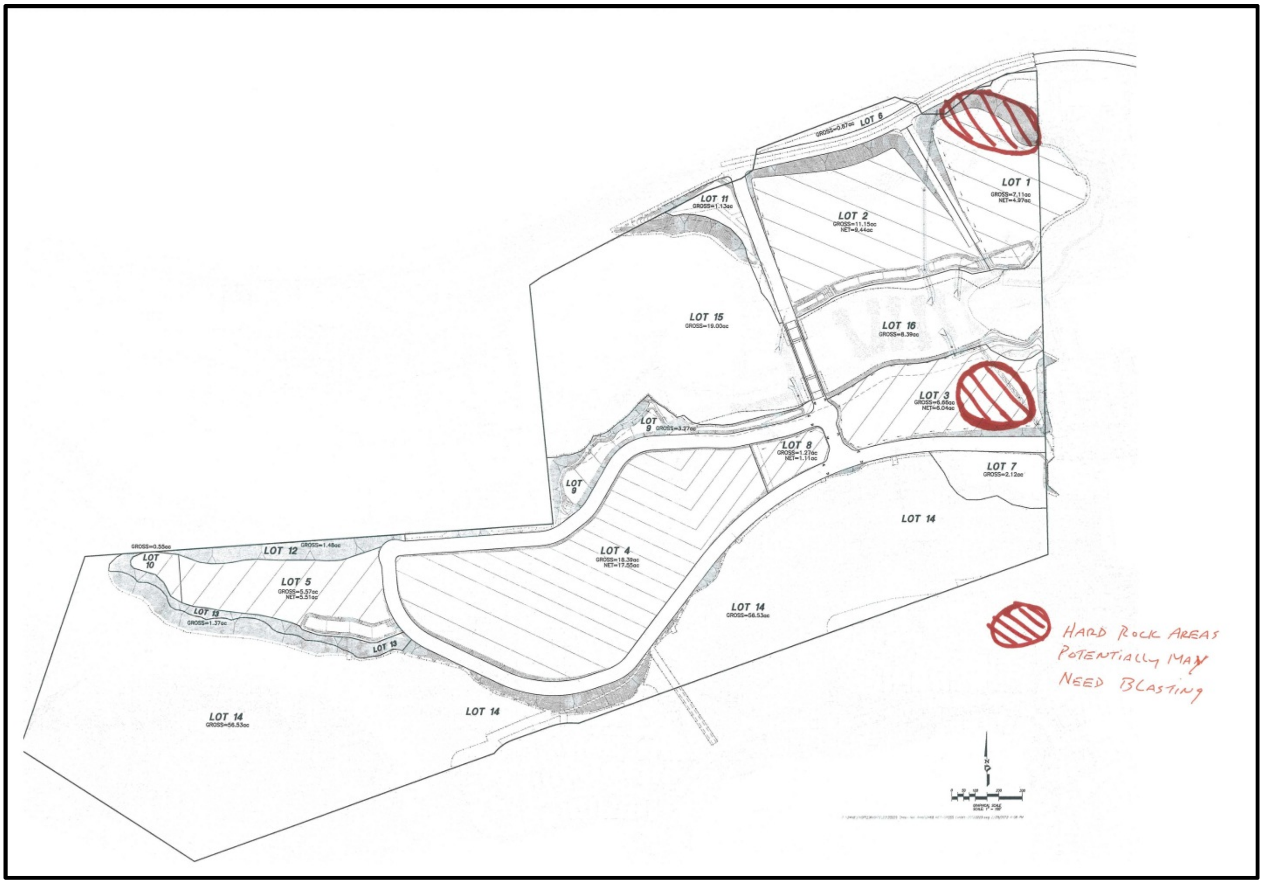
Equipment	Approximate Velocity Level at 25 Feet (VdB)	Approximate RMS Velocity at 25 Feet (in/sec)	Approximate Velocity Level at 100 Feet (VdB)	Approximate RMS Velocity at 100 Feet (in/sec)
Small bulldozer	58	0.003	40.0	0.0004
Jackhammer	79	0.035	61.0	0.0044
Loaded trucks	86	0.076	68.0	0.0095
Large bulldozer	87	0.089	69.0	0.0111
		FTA Criteria	88	0.3
		Significant Impact?	**No**	**No**
[1] PPV at Distance D = PPVref x $(25/D)^{1.5}$				

The FTA has determined vibration levels that would cause annoyance to a substantial number of people and potential damage to building structures. The FTA criterion for vibration induced structural damage is 0.30 in/sec for the peak particle velocity (PPV) for to "Engineered concrete and masonry buildings". Project construction activities would result in PPV levels below the FTA's criteria for vibration induced structural damage. Therefore, project construction activities would not result in vibration induced structural damage to residential buildings near the demolition and construction areas. The FTA criterion for infrequent vibration induced annoyance is 83 Vibration Velocity (VdB) for commercial type uses. Construction activities would generate levels of vibration that would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

5.4 Blasting Vibration Findings and Mitigation

Blasting for construction projects typically results in an RMS vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This is equivalent to a peak particle velocity of about 0.4 inch per second. The locations of the potential areas that may require blasting are shown in Figure 5-1 below. As discussed above the smallest distance between existing uses (commercial) and the blasting activity was assumed to be 100 feet. Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing structure would be about 88 VdB and 0.15 inch per second, respectively.

Figure 5-1: Potential Blasting Locations



Based on the construction vibration damage criteria published by the FTA, the threshold for vibration levels to damage "Engineered concrete and masonry buildings" are 98 VdB and 0.30 inch per second. Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 83 VdB would be slightly exceeded when blasting occurred within about 100 feet of existing commercial uses. If blasting is required within 100 feet of existing structures, the potential annoyance may not be completely avoided but can be minimized by following the proper blasting procedures and with proper notice annoyances can be avoided.

The nearest residential uses are located more than 1,000 feet from the potential blasting locations and vibration sources. Based on this distance separation no vibration impacts are anticipated from the Project's construction or blasting operations.

6.0 CERTIFICATIONS

The contents of this report represent an accurate depiction of the noise and vibration environment and impacts within and surrounding the proposed Quarry Creek residential development. The information contained in this report was based on the best available data at the time of preparation.

DRAFT

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Date October 3, 2012

ATTACHMENT A

FUTURE EXTERIOR NOISE MODEL
INPUT AND OUTPUT FILES

QUARRY CREEK UNMITIGATED
T-MARRON ROAD, 1
1977 , 30 , 37 , 30 , 6 , 30
T-SR 78, 2
5658 , 65 , 137 , 65 , 155 , 65
T-SR 78, 3
5658 , 65 , 137 , 65 , 155 , 65
L-, 1
N,5020.,1867,140,
N,4141.,1848,130,
N,3641.,1760,150,
N,2984.,1228,120,
N,2700.,876,122,
N,2464.,794,130,
N,1814.,1037,124,
N,1738.,1129,122,
N,1731.,1388,120,
N,2412.,1459,110,
N,2739.,1811,110,
N,3548.,1957,110,
L-WESTBOUND, 2
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N,3640.,3362,170,
N,2438.,2907,141,
N,1864.,2708,143,
N,1265.,2629,118,
N,480.,2720,79,
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L-EASTBOUND, 3
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B-BERM LOT 11, 3 , 1 , 0 ,0
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4079.,1871,130,130,
3802.,1842,120,120,
B-BERM SR 78, 5 , 1 , 0 ,0
4981.,3688,197,197,
4635.,3627,192,192,
4348.,3523,186,186,
3781.,3328,172,172,
3264.,3132,153,154,
2821.,2965,140,140,
2477.,2833,140,140,
1886.,2627,143,143,
1264.,2541,118,118,
471.,2636,80,80,
-408.,2771,56,56,
B-K-RAIL SR78, 6 , 4 , 0 ,0
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4403.,3618,189,192,
3650.,3339,170,173,
2451.,2888,141,144,
1875.,2683,143,146,
1265.,2601,118,121,
475.,2690,79,82,
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B-BERM LOT 15, 7 , 1 , 0 ,0
2907.,2826,120,120,
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2178.,2518,107,107,
1872.,2479,117,117,
B-BERM LOT 7, 8 , 1 , 0 ,0
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4473.,1796,140,140,
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4491.,1656,140,140,
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1748.,1349,123,123,
2455.,1422,119,119,
2741.,1769,112,118,
3042.,1818,112,118,
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3242.,1826,114,114,
3523.,1909,114,114,
3576.,1833,114,114,
3555.,1759,114,114,
3310.,1634,116,116,
B-BERM LOT 9, 11 , 1 , 0 ,0
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2881.,1884,104,104,
2759.,1863,104,104,
2660.,1792,106,106,
2515.,1578,108,108,
2438.,1516,110,110,
2430.,1652,102,102,
R, 1 , 67 ,500
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R, 2 , 67 ,500
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R, 3 , 67 ,500
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R, 4 , 67 ,500
3645,2769,117.,LOT 2
R, 5 , 67 ,500
4238,2134,125.,LOT 3
R, 6 , 67 ,500
3886,2145,122.,LOT 3
R, 7 , 67 ,500
4323,1740,135.,LOT 7
R, 8 , 67 ,500
2851,1718,119.,LOT 4
R, 9 , 67 ,500
2762,1141,127.,LOT 4
R, 10 , 67 ,500
1961,1279,130.,LOT 4
R, 11 , 67 ,500
1262,1272,123.,LOT 5
R, 12 , 67 ,500
694,1332,121.,LOT 10
D, 4.5
ALL,ALL
K,-5
2  ,2,4,5,6,7
K,-5
3  ,2,4,5,6,7
K,-3
2  ,1,3,8,9,10,11,12,13
K,-3
3  ,1,3,8,9,10,11,12,13
C,C
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SOUND32 - RELEASE 07/30/91

TITLE:
QUARRY CREEK UNMITIGATED

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	LOT 1	67.	500.	56.4
2	LOT 1	67.	500.	56.9
3	LOT 2	67.	500.	59.9
4	LOT 2	67.	500.	59.7
5	LOT 3	67.	500.	55.4
6	LOT 3	67.	500.	56.9
7	LOT 7	67.	500.	55.3
8	LOT 4	67.	500.	58.9
9	LOT 4	67.	500.	59.2
10	LOT 4	67.	500.	59.3
11	LOT 5	67.	500.	56.6
12	LOT 10	67.	500.	56.0

QUARRY CREEK SECOND LEVEL FACADES
T-MARRON ROAD, 1
1977 , 30 , 37 , 30 , 6 , 30
T-SR 78, 2
5658 , 65 , 137 , 65 , 155 , 65
T-SR 78, 3
5658 , 65 , 137 , 65 , 155 , 65
L-, 1
N,5020.,1867,140,
N,4141.,1848,130,
N,3641.,1760,150,
N,2984.,1228,120,
N,2700.,876,122,
N,2464.,794,130,
N,1814.,1037,124,
N,1738.,1129,122,
N,1731.,1388,120,
N,2412.,1459,110,
N,2739.,1811,110,
N,3548.,1957,110,
L-WESTBOUND, 2
N,4978.,3770,197,
N,4403.,3643,189,
N,3640.,3362,170,
N,2438.,2907,141,
N,1864.,2708,143,
N,1265.,2629,118,
N,480.,2720,79,
N,-392.,2856,56,
L-EASTBOUND, 3
N,4976.,3714,197,
N,4409.,3588,189,
N,3661.,3314,170,
N,2461.,2861,141,
N,1879.,2655,143,
N,1265.,2573,118,
N,470.,2660,79,
N,-402.,2798,56,
B-BARRIER LOT 1, 1 , 1 , 0 ,0
4449.,3177,170,170,
4438.,3236,170,170,
4404.,3275,170,170,
4276.,3326,160,160,
4205.,3352,160,160,
3950.,3231,150,150,
3958.,3162,150,150,
4002.,3079,140,141,
4112.,2888,135,135,
B-BARRIER LOT 2, 2 , 1 , 0 ,0
4085.,2836,120,120,
4024.,2939,130,130,
3901.,3144,150,150,
3874.,3164,150,150,
3662.,3094,150,150,
3506.,3063,150,150,
3226.,2998,130,130,
3282.,2803,120,120,
3327.,2691,125,125,
B-BERM LOT 11, 3 , 1 , 0 ,0
3207.,2840,120,120,
3163.,2927,120,120,
3101.,2960,120,120,
2907.,2826,120,120,
3069.,2807,120,120,
3197.,2723,120,120,
3254.,2621,120,120,
B-BERM LOT 13, 4 , 1 , 0 ,0
4537.,2198,145,145,

4489.,2165,145,145,
4493.,2006,140,140,
4515.,1903,140,140,
4484.,1876,140,140,
4360.,1873,140,140,
4079.,1871,130,130,
3802.,1842,120,120,
B-BERM SR 78, 5 , 1 , 0 ,0
4981.,3688,197,197,
4635.,3627,192,192,
4348.,3523,186,186,
3781.,3328,172,172,
3264.,3132,153,154,
2821.,2965,140,140,
2477.,2833,140,140,
1886.,2627,143,143,
1264.,2541,118,118,
471.,2636,80,80,
-408.,2771,56,56,
B-K-RAIL SR78, 6 , 4 , 0 ,0
4978.,3744,197,200,
4403.,3618,189,192,
3650.,3339,170,173,
2451.,2888,141,144,
1875.,2683,143,146,
1265.,2601,118,121,
475.,2690,79,82,
-397.,2827,56,59,
B-BERM LOT 15, 7 , 1 , 0 ,0
2907.,2826,120,120,
2556.,2702,94,94,
2178.,2518,107,107,
1872.,2479,117,117,
B-BERM LOT 7, 8 , 1 , 0 ,0
4096.,1808,130,130,
4290.,1806,140,140,
4473.,1796,140,140,
4491.,1754,140,140,
4491.,1656,140,140,
B-BARRIER LOT 8&4, 9 , 1 , 0 ,0
3310.,1634,116,116,
3095.,1438,116,116,
3013.,1324,119,119,
2767.,1010,122,122,
2472.,838,121,121,
1998.,974,130,130,
1805.,1096,126,126,
1748.,1349,123,123,
2455.,1422,119,119,
2741.,1769,112,118,
3042.,1818,112,118,
B-BARRIER LOT 8&4 CONT., 10 , 1 , 0 ,0
3042.,1818,112,112,
3242.,1826,114,114,
3523.,1909,114,114,
3576.,1833,114,114,
3555.,1759,114,114,
3310.,1634,116,116,
B-BERM LOT 9, 11 , 1 , 0 ,0
2875.,1945,104,104,
2881.,1884,104,104,
2759.,1863,104,104,
2660.,1792,106,106,
2515.,1578,108,108,
2438.,1516,110,110,
2430.,1652,102,102,
R, 1 , 67 ,500
4152,3226,133.,LOT 1

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R, 2 , 67 ,500
4262,3007,131.,LOT 1
R, 3 , 67 ,500
3564,2960,128.,LOT 2
R, 4 , 67 ,500
3645,2769,127.,LOT 2
R, 5 , 67 ,500
4238,2134,135.,LOT 3
R, 6 , 67 ,500
3886,2145,132.,LOT 3
R, 7 , 67 ,500
4323,1740,145.,LOT 7
R, 8 , 67 ,500
2851,1718,129.,LOT 4
R, 9 , 67 ,500
2762,1141,137.,LOT 4
R, 10 , 67 ,500
1961,1279,140.,LOT 4
R, 11 , 67 ,500
1262,1272,133.,LOT 5
R, 12 , 67 ,500
694,1332,131.,LOT 10
K,-3
2  ,2,4,5,6,7
K,-3
3  ,2,4,5,6,7
K,-3
2  ,1,3,8,9,10,11,12,13
K,-3
3  ,1,3,8,9,10,11,12,13
C,C
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SOUND32 - RELEASE 07/30/91

TITLE:
QUARRY CREEK SECOND LEVEL FACADES

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	LOT 1	67.	500.	60.5
2	LOT 1	67.	500.	61.5
3	LOT 2	67.	500.	63.0
4	LOT 2	67.	500.	64.8
5	LOT 3	67.	500.	60.7
6	LOT 3	67.	500.	62.3
7	LOT 7	67.	500.	60.4
8	LOT 4	67.	500.	62.9
9	LOT 4	67.	500.	64.0
10	LOT 4	67.	500.	62.4
11	LOT 5	67.	500.	60.0
12	LOT 10	67.	500.	58.7